PHENIX Background Status

John Haggerty

Brookhaven National Laboratory
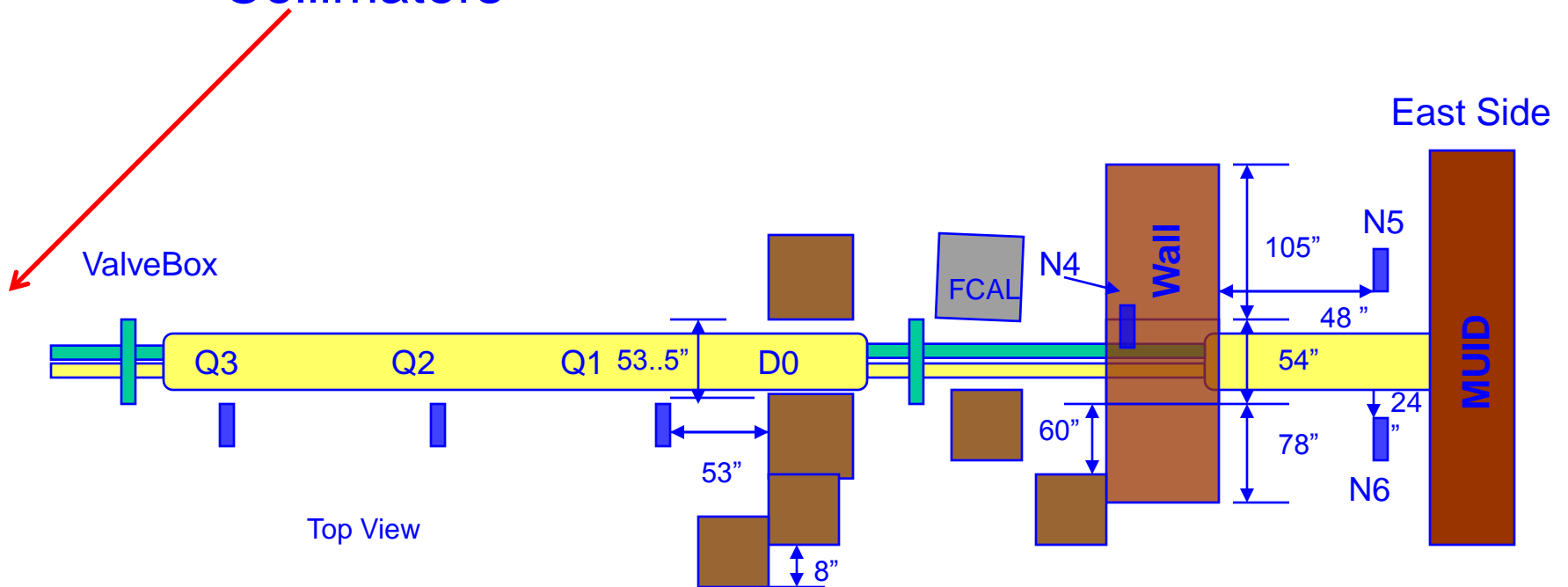
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The weekend background

We decided to turn on the MUID and RPC starting Friday night when the background counters were higher than usual by a factor of ~2 (500 kHz in N3)

PHENIX history and lore is that we should wait until the counters outside Q1Q2Q3 are "low" which has historically been redefined (up) over runs
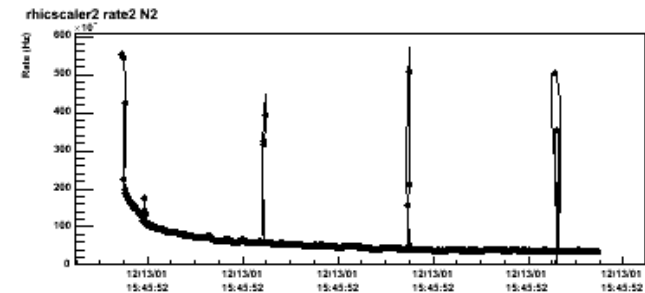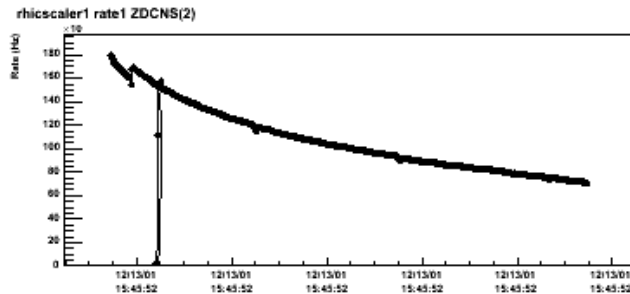
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Layout
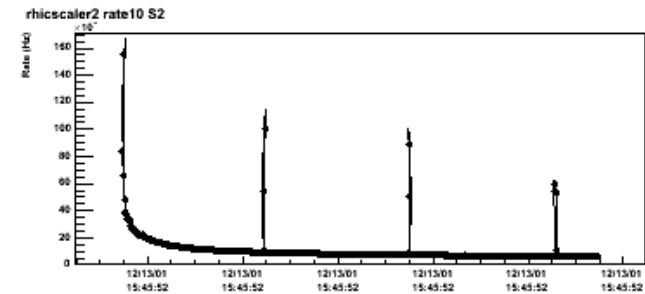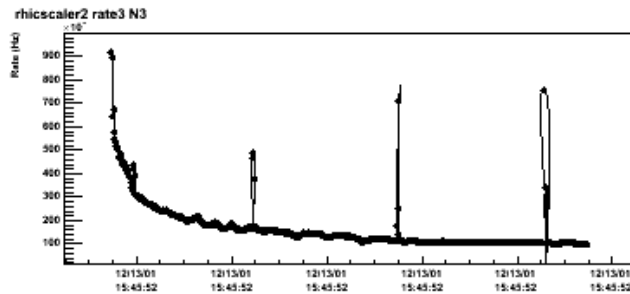
Collimators

East Side

ValveBox

| Q3 | Q2 | Q1 | 53..5" | D0 |

FCAL   N4   Wall   105"   N5

MUID

48 "

54"

60"

24 "

53"

78"

N6

Top View

8"

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Background counters

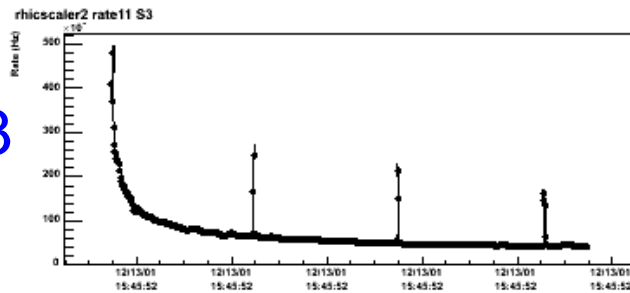# Luminosity scalers

BBLL1   BBLL1   ZDCLL1
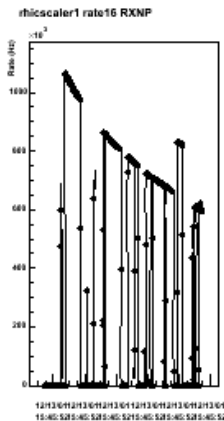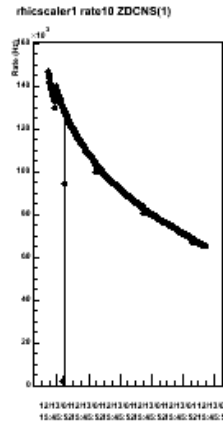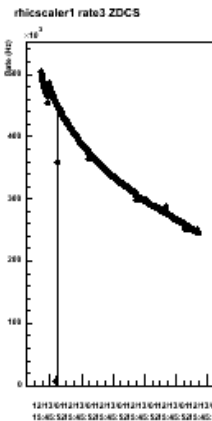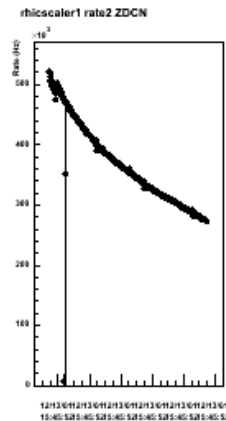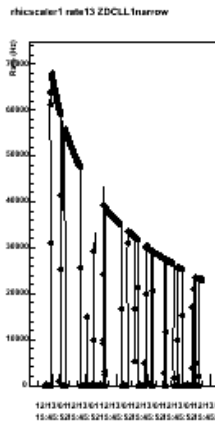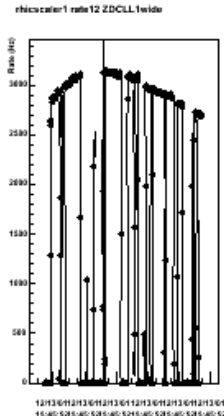
ZDCLL1   ZDC singles   RXNP
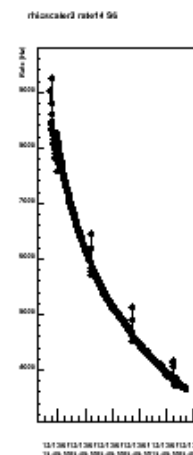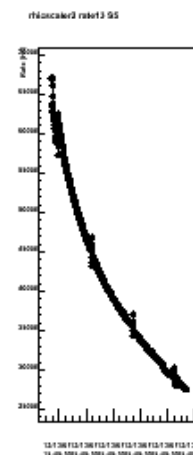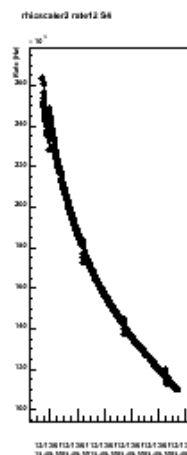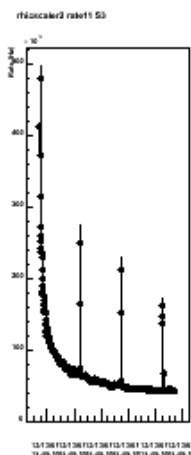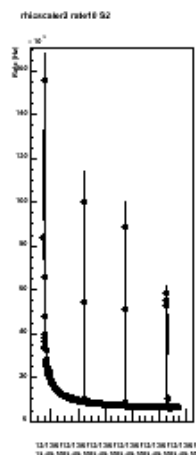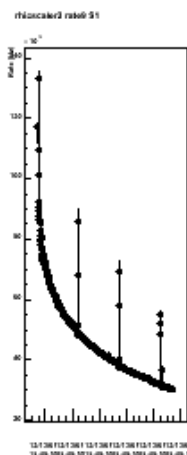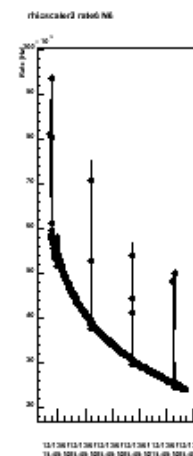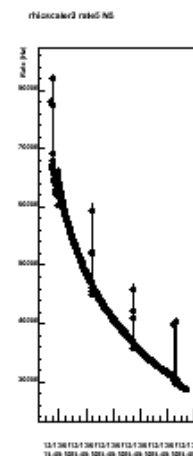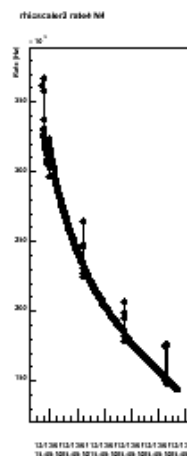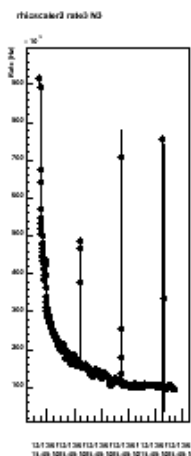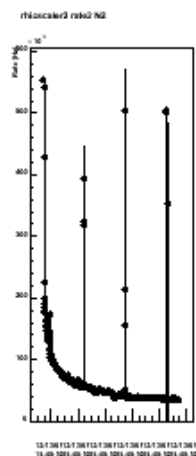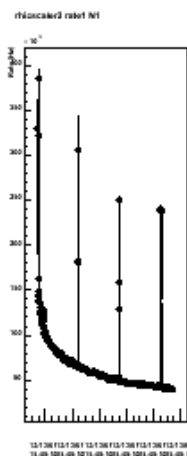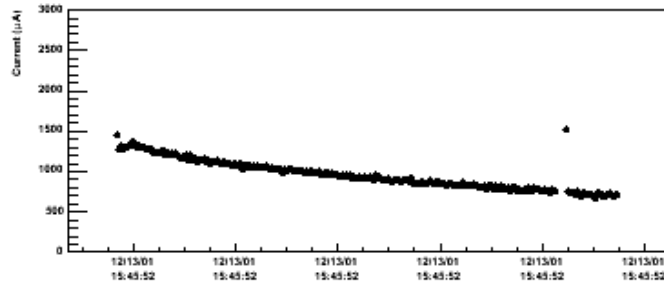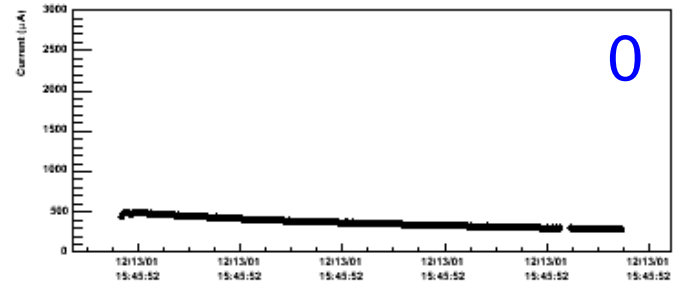
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All background counters

N

S

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MUID.S Currents

MUID.N Currents

RPC.S

Run9 1008 Current Log (uA)
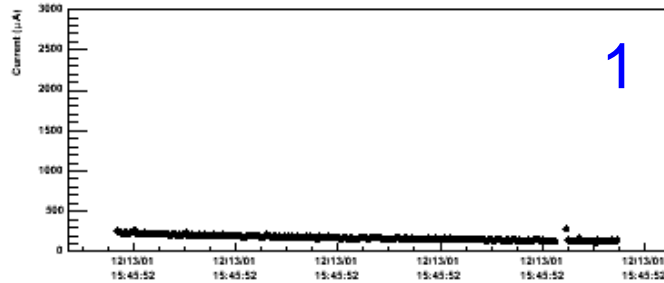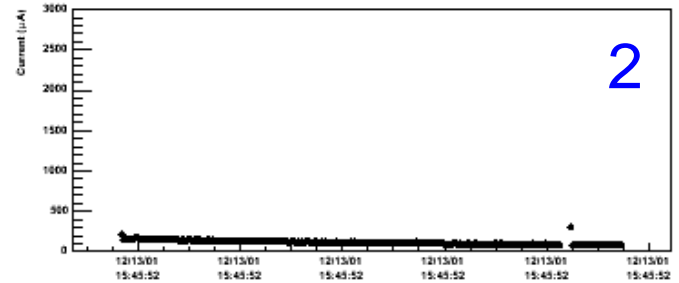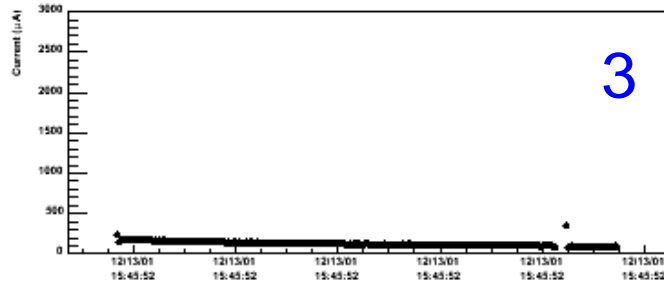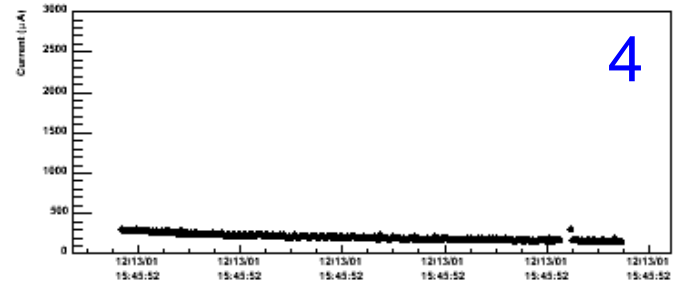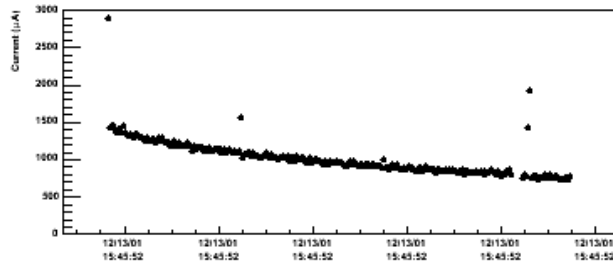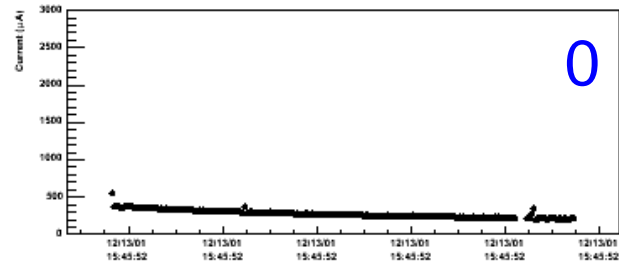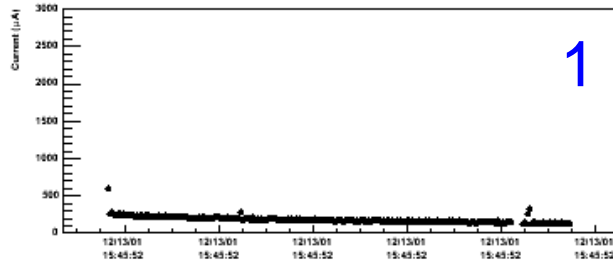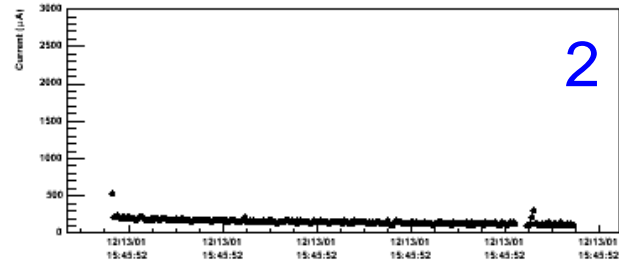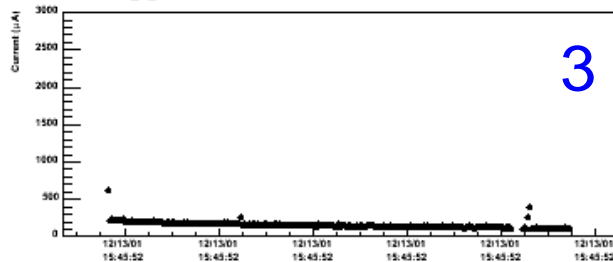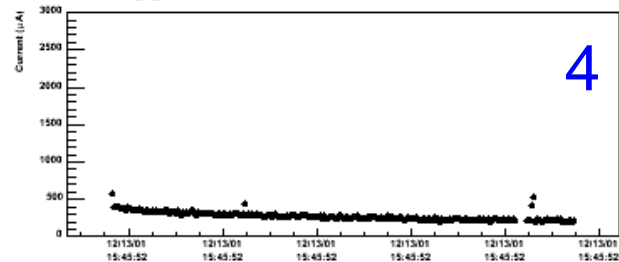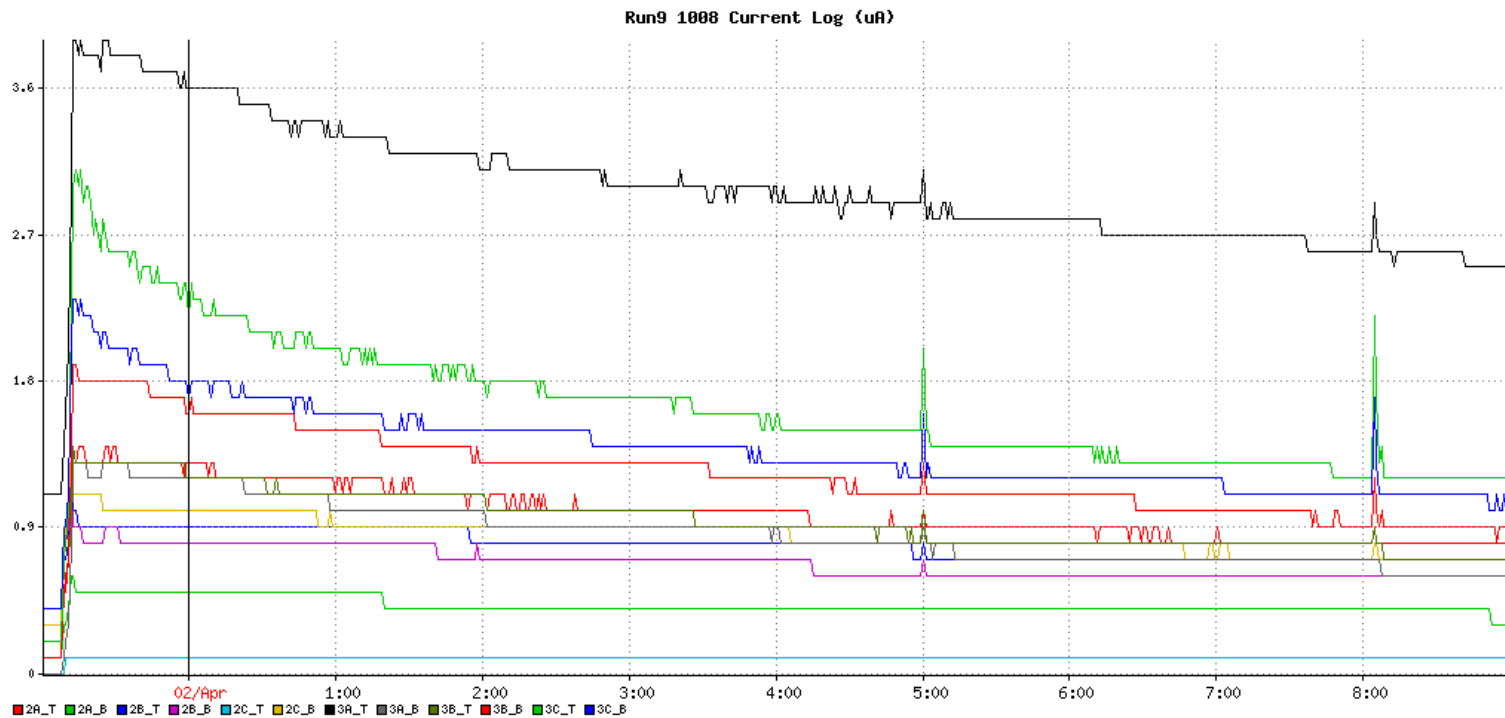
Trips

- DC 12 (see below)

- PC 20

- MUID 151 (only 5 before midnight)

- TEC 1

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HV_DC_W_S_KS00-07_UV2_GBS |    278402 | 2009-04-02 05:38:19.716484-04 |      0 | {1873466,-1262485488,-1263524392,9544888,83,6950439,-1208941832,4764032}   | channel trip
HV_DC_W_S_KS00-07_UV2_PBS |    278402 | 2009-04-02 05:38:19.772817-04 |      0 | {0,0,-1208941848,4668387,2682868,-1262485488,-1263524392,-1208941848}      | channel trip
HV_DC_W_S_KS00-07_X2_GBS  |    278402 | 2009-04-02 05:38:19.802556-04 |      0 | {1873466,-1262485488,-1263524392,9544888,83,6950439,-1208941832,4764032}   | channel trip
HV_DC_W_S_KS00-07_X2_PBS  |    278402 | 2009-04-02 05:38:19.832521-04 |     48 | {48,48,48,48,1280,1280,1280,1280}                                          | channel trip
HV_DC_E_S_KS04-11_UV1_PBS |    278404 | 2009-04-02 06:51:32.79404-04   |      1 | {512,16384,1,1,1,0,1,1}                                                     | channel trip
HV_DC_E_S_KS04-11_X1_BBS  |    278404 | 2009-04-02 06:51:33.494747-04  |      1 | {156,0,-1229921512,4723652,165995600,1,1,4723630}                          | channel trip
HV_DC_E_S_KS04-11_X1_GBS  |    278404 | 2009-04-02 06:51:33.62277-04   |  16384 | {1,1,1,1,1,6950439,1,4764032}                                              | channel trip
HV_DC_E_S_KS04-11_X1_PBS  |    278404 | 2009-04-02 06:51:33.853524-04  |      0 | {0,16384,1,1,1,0,1,1}                                                       | channel trip
HV_DC_E_S_KS12-19_UV1_GBS |    278404 | 2009-04-02 06:51:33.883717-04  |  16384 | {1,1,1,1,1,6950439,1,4764032}                                              | channel trip
HV_DC_E_S_KS12-19_UV1_PBS |    278404 | 2009-04-02 06:51:33.903497-04  |      0 | {0,16384,-1262483556,1,1,1,1,1}                                            | channel trip
HV_DC_E_S_KS12-19_X1_GBS  |    278404 | 2009-04-02 06:51:33.904028-04  |  16384 | {1,1,1,1,1,6950439,1,4764032}                                              | channel trip
HV_DC_E_S_KS12-19_X1_PBS  |    278404 | 2009-04-02 06:51:33.93351-04   |      0 | {-1,16384,-1262483556,1,1,1,1,1}                                           | channel trip
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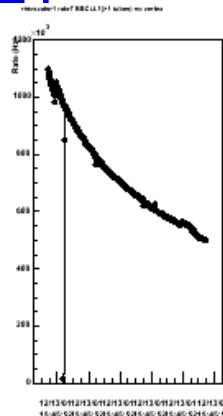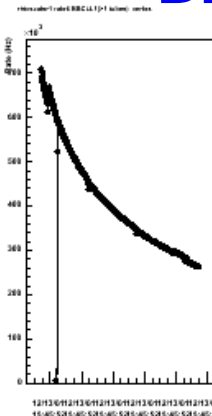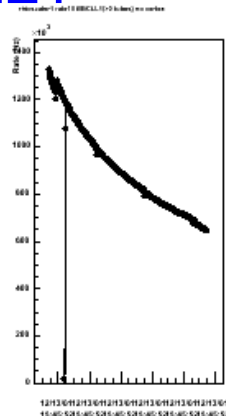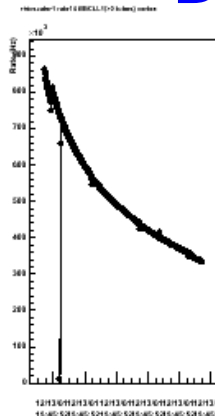
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MUID hit rates

- MUID hit rates can be used to estimate background rates

- Most reliable way is to take a completely unbiased trigger and count hits—clock triggers

- An example from Itaru Nakagawa shows increase in hits in gap 4 (farthest from IP)

Arm=0 Panel=2 Orientation=0

gap 0
gap 1
gap 2
gap 3
gap 4

Arm=0 Panel=2 Orientation=1

gap 0
gap 1
gap 2
gap 3
gap 4

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Cogged, collimated
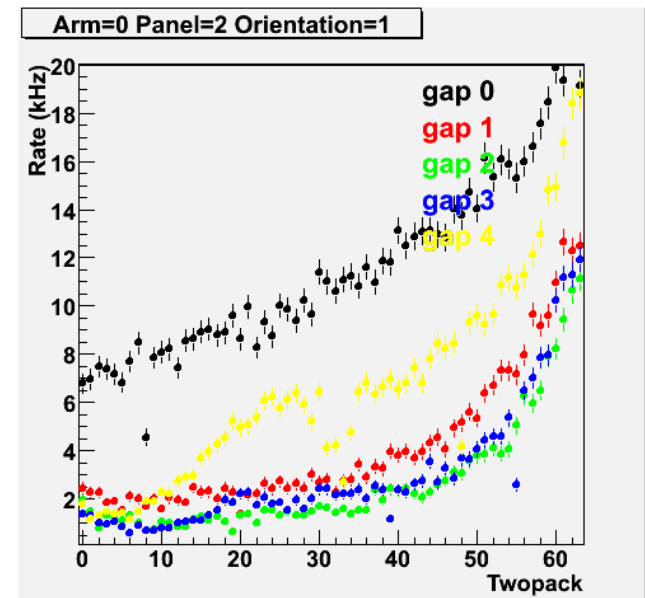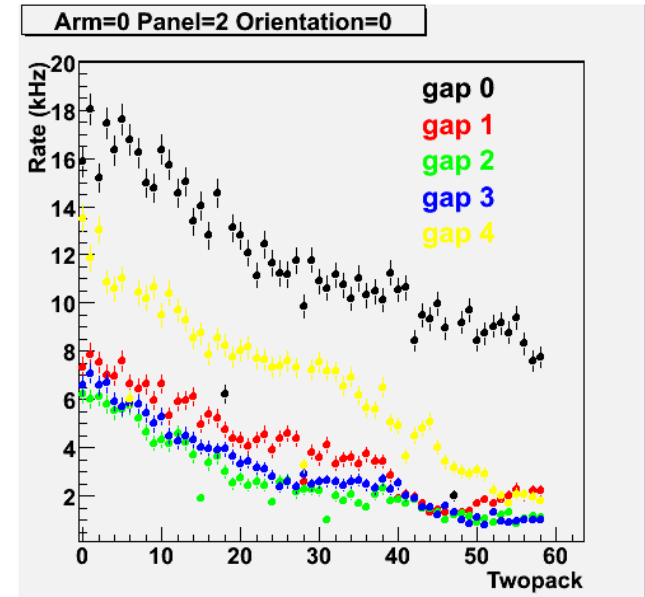
Why we care

- Historically, the worry has been that varied current draw in the MUID would lead to varying muon trigger efficiency depending on beam conditions

- We are now trying to determine whether that's true or whether we might be able to live with it

- Of course, an increased hit rate in the MUTR and MUID leads to more confusion, probably reducing the resolution, but that's a fact of life at high luminosity

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RPC

- New detector, prototype in south tunnel (and IR)

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Shielding holes

- There are some holes in the shielding
- We should see whether we can plug them, particularly around the beam pipe
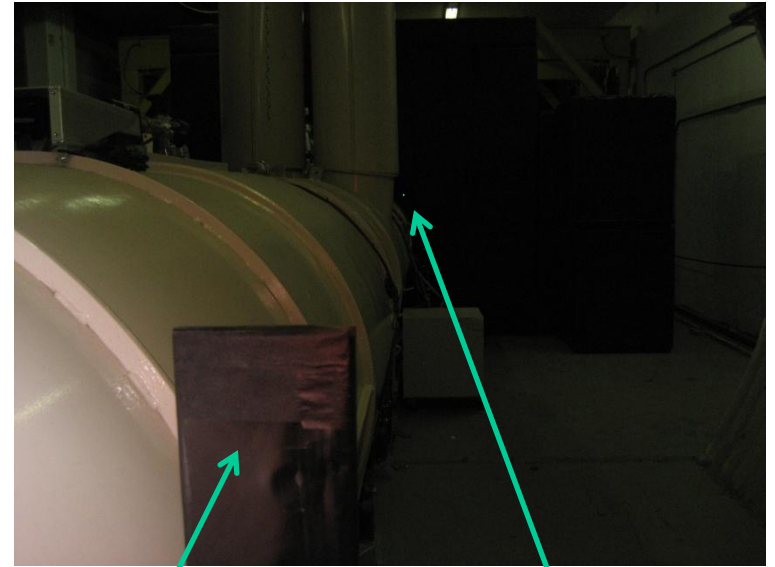
N2

Laser pointer to back of MUID

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Radiological survey

- I had HP do a radiological survey of the area around the collimators and quad triplet, and D0 magnet
- Collimators are pretty hot!
- Quadrupole activity is pretty uniform along the magnet, higher than it was

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# What to make of it?

- Looks to me like 1,2,3 counters measure secondaries from the collimator which disappears fairly quickly as the beam is scraped

- Do the secondaries cause mischief in PHENIX IR? Not really any evidence for it

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Scale to collision rate

- Started looking at background counters scaled to a collision rate (chose ZDCNS)

- Look only at counters 5 and 6 after the shielding
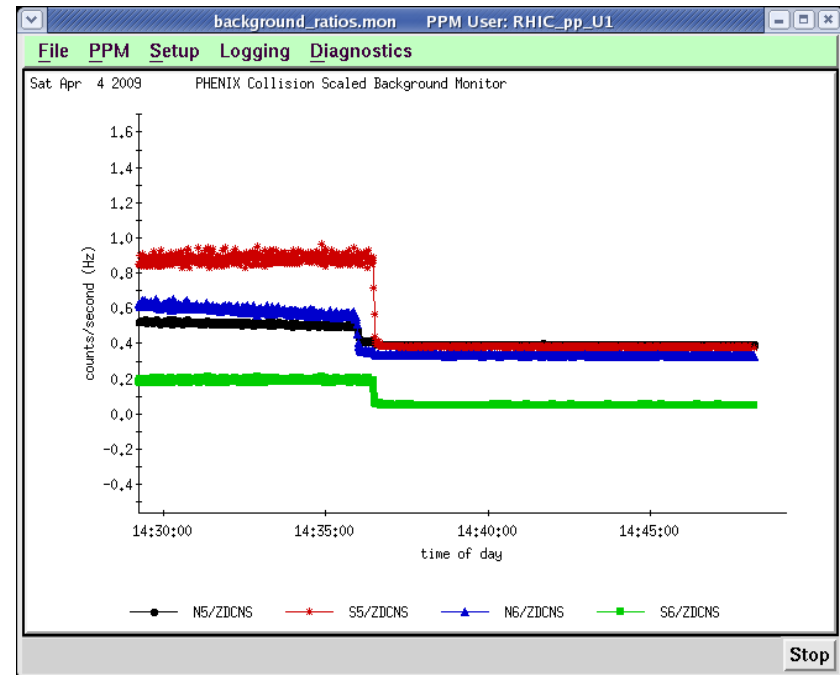
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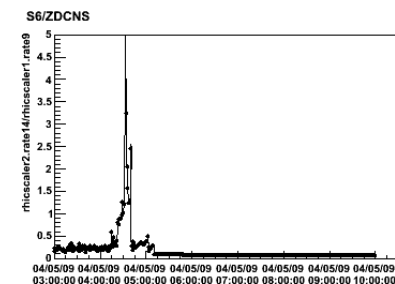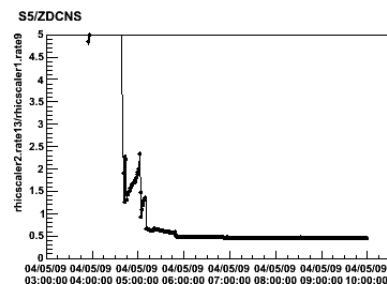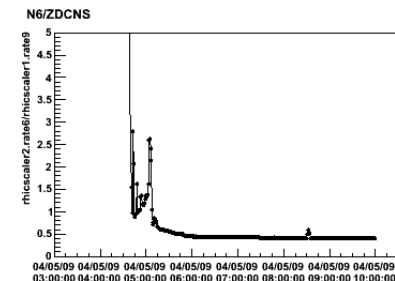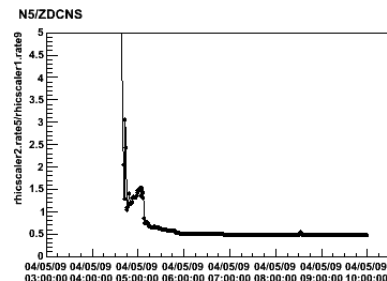
New background limits

- Over the weekend, I started having the shift crews ramp up as soon as the 5,6 ratios to ZDCNS were about 0.5 as seen in background_ratios.mon

- OK so far…

What next?

- If we can accumulate enough data with high background rates, we should be able to measure the efficiency as a function of rate

- We don't have good measurements of background in the region that will have the Si vertex detectors…

- I have come to think that much of what the 1,2,3 counters see is splash that we don't actually care about, but it may find shielding holes; should we just shield the quads and collimator?

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